"Synthesis, Characterization and Biological Evaluation of Transition Metal Complexes of some new Heterocyclic Schiff bases"

SHORT RESUME OF THE PLAN PROPOSED FOR INVESTIGATION FOR Ph.D. DEGREE UNDER THE FACULTY OF **SCIENCE**.

TO BE SUMBITTED TO

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

By

Mr. Jadhav Vithal Kishanrao

(Research Student)

Assistant Prof. & HOD,

Dept. of Chemistry.

V. D. M. D. College, Degloor

Dist: Nanded

Under the Guidance of

Dr. Chidrawar A. B.

(Research Guide)

Associate Prof. & HOD,

Dept. of Chemistry

Degloor College, Degloor

Dist: Nanded

May- 2019

"Synthesis, Characterization and Biological Evaluation of Transition Metal Complexes of some new Heterocyclic Schiff bases"

Introduction:

In recent days large area of inorganic chemistry research is acquired by coordination chemistry due to its interesting and significant properties. Coordination chemistry has always been challenge. The modern study of coordination chemistry begins with Alfred Werner. Werner was the first who could able to explain the nature of bonding in complexes. In the complex, the metal ion is present at the center and has capacity to accept lone pair of electrons. The term ligand is applied to the particular molecule or ion which is attached to the central metal ion in the complexes. The common donor atoms present in ligands are N, O and S. The nature of ligands coordinated to the metal ion mostly determines the properties of the inorganic, organometallic or bioinorganic model compounds. The pyrazole is one of the most studied heterocyclic aromatic compounds in coordination chemistry as single ligand or incorporated in polidentate ligands. Another of the most studied heterocyclic aromatic compounds in coordination chemistry is the imidazole, an analogue of pyrazole with two non-adjacent nitrogen atoms.

Heterocyclic compounds plays an important role in industry as well as in our life. Various natural products contain heterocyclic compounds such as alkaloids and glycosides and they have been used in medicinal since ancient time. Most of the alkaloids are nitrogenous bases, occurring in plants. Further, many antibiotics including penicillin and streptomycin also contain heterocyclic ring system. Important drugs such as suphathiazol, pyrethrin, rotenine, cocaine, barbiturates also possess heterocyclic system. These compounds are also known to be used as starting material for the synthesis of new drugs[1-4]. Due to multiple utility of heterocyclic compounds in various fields mainly in pharmaceutics,[5-6] pesticides,[7] veterinary,[8] dyes,[9] polymers,[10] automobiles[11] etc, various workers have synthesized these compounds.

Benzothiazoles are bicyclic ring system.[12] A number of 2-aminobenzothiazoles have been studied as central muscle relaxants and found to interfere with glutamate

neurotransmission in biochemical, electrophysiological and behavioural experiments.[13] Benzothiazole ring made from thiazole ring fused with benzene ring. Thiazole ring is a five-member ring consists of one nitrogen and one sulphur atom in the ring. Benzothiazole derivatives have been studied and found to have various chemical reactivity and biological activity. It was found to be possessing pharmacological activities such as anti-viral, anti-bacterial, anti-microbial and fungicidal activities.[14] Benzothiazole nucleus containing molecules are also reported as anti-allergic,[15] anti-diabetic,[16] antitumor,[17] anti-inflammatory, anti-helmintic, and anti-HIV agents. 2-aryl substituted benzothiazoles show antitumor activity while condensed pyrimidobenzothiazoles and benzothiazolo-quinazolines showed anti-viral activity.[18-19] Substituted 6-nitro and 6-aminobenzothiazoles have been reported for antimicrobial activity.

The field of Schiff base complexes has been fast developing on account of the wide variety of possible structures for the ligands depending upon the aldehydes and amines. Schiff bases are considered as a very important class of organic compounds, which have wide applications in many biological aspects.[20] Transition metal complexes of Schiff bases are one of the most adaptable and thoroughly studied systems. These complexes have also applications in clinical and analytical and industrial in addition to their important roles in catalysis and organic synthesis.[21] Studies of a new kind of chemotherapeutic Schiff bases are now attracting the attention of biochemists.[22-23] Schiff base metal complexes can now be considered a widely studied subject due to their industrial and biological applications.[24] Earlier work reported that some drugs showed increased activity when administered as metal complexes rather than as organic compounds.[25-26]

Maihub et al[27] synthesized Fe(III) complexes with Schiff base derived from unsubstituted salicylaldehyde and 2-amino benzoic acid. Morad et al[28] synthesized Ni(II) complex with salicylaldehyde and 2-amino benzoic acid and studied its antibacterial activity.

In view of the above considerations it is proposed to undertake a comprehensive study of transition metal complexes of new type of Schiff's base ligands employing various physicochemical techniques.

Hence the proposed Research Topic is **"Synthesis, Characterization and biological evaluation of Transition metal complexes of some new Heterocyclic Schiff bases"**

Interdisciplinary Relevance:

The present work has a quality interdisciplinary relevance. The proposed research work is regarding biologically & pharmacologically active compounds. So this work may prove beneficial for human being.

Review of research & development in the subject :

a) International Status :

The Schiff,s bases are found to be biologically active and their activity increases when these are coordinated with transition metals. The complexes of this type act as a catalyst and due to this a lot of work is going on throughout the World of this subject.

Maihub et al[27] synthesized Fe(III) complexes with Schiff base derived from unsubstituted salicylaldehyde and 2-amino benzoic acid.

Morad et al[28] synthesized Ni(II) complex with salicylaldehyde and 2-amino benzoic acid and studied its antibacterial activity.

b) National Status :

Recently the Indian researchers attention is drawn towards this field. considerable work is carried out in this area.

C. Gyanakumari et al[29] prepared new Schiff base, 3-ethoxy salicylidene amino benzoic acid from 3-ethoxy salicylaldehyde and 2-amino benzoic acid. Metal complexes of the Schiff base were prepared from nitrate/chloride salts of Ni(II), Co(II) Cu(II) and Zn(II) in an alcoholic medium.

Aims & Objectives :

Looking to the applications of Schiff's bases of heterocyclic compounds in the present work

1. To study the coordination behavior of newly synthesized Schiff's bases with transition metal ions.
2. To prepare their metal complexes.
3. Characterization of metal complexes by various techniques.
4. To study percentage Composition, magnetic susceptibility and Melting point /Boiling point.

Methodology :

1. To synthesize several derivatives of Schiff's bases of benzothiazole and their metal complexes.

2. To Study spectra of new derivatives of Schiff's bases of benzothiazole and their metal complexes.

3. To evaluate biological activities of synthesized compounds against various stains of Microorganisms.

4. To study elemental analysis, magnetic susceptibility and Melting point /Boiling point.

Year wise plane of work & target to be achieved.

The proposed project work requires a period of at least three years

Year wise distribution of work

i) First year :

Review of literature & preparation of new derivatives of benzothiazole and its Schiff's bases.

ii) Second Year :

Preparation of new Schiff's base metal complexes. Structural elucidation of above prepared compounds by spectroscopic techniques etc.

iii) Third Year :

Biological studies of newly synthesized derivatives, tabulation of data obtained & submission of final synopsis.

Dr. Chidrawar A. B.
(Research Guide)
Associate prof. & HOD,
Dept of chemistry
Degloor College, Degloor
Dist. Nanded Pin 431717
Mob : 9423140093

Mr. Jadhav V. K
(Research Student)
Assistant prof. & HOD,
Dept. of Chemistry
V.D.M.D. College, Degloor
Dist. Nanded Pin 431717
Mob. 9423437301

References :

1. F. Saczewski, J. Saczewski; Trend. Hetero. Chem. 2003, 9, 19-31.
2. J. B. Sperry, D. L. Wright; Curr. Opini. Drug Disco. Develop. 2005, 8, 723-740.

3. M. Raposo, M. Manuela; Targets in Hetero. Syst. 2007, 11, 122-154.
4. W. Su, W. Zhang, T. Wang, X. Yan, Cai, J. Duan; Fami. Zhu. Shen. Gong. Shu. 2008, 33.
5. P. Vicini, A. Geronikaki, M. Incerti; Khimiya i Bio. Aktivnost Kislorod-i Serusoderz hashchikh Geterotsiklov", 2nd, Moscow, 2003, 1, 211-216.
6. J. Salvador, R. Pinto and S. Silvestre; Current Org. Syn., 2009, 6(4), 426-70.
7. Y. Liu, E. Zhao, W. Zhu, H. Gao and Z. Zhou; J. chromatography A, 2009, 1216(6), 885-91.
8. V. Furtula, L. Huang and P. Chambers; J. Environ. Sci. Health, 2009, 44(7), 717-23.
9. M. Dekhtyar; Dyes and Pigments, 2007, 74(3), 744-48.
10. F. Lu; Cur. Trends in Poly. Sci., 1999, 4, 263-71.
11. H. Harashina; Jpn. Kokai Tokkyo Koho, 2004, 5.,
12. Chaudhary, P.; Sharma, P. K.; Sharma, A.; Varshney, J. “Recent advances in pharmacological activity of benzothiazole derivatives”; International journal of current pharmaceutical research, 2010, 2, 5
13. Bryson, M.; Fulton, B.; Benfield, P.; Drugs. 1996, 52, 549
14. Singh, S. P.; Seghal, S.; Indian J Chem. 1988, 27 B, 941
15. Musser, J. H.; Brown, R. E.; Love, B.; Baily, K.; Jones, H.; Kahen, R. Synthesis of 2-(2,3-Dihydro-2-oxo-l,3,4-oxadiazol-5-yl) Benzo Heterocycles. A Novel Series of Orally Active Antiallergic Agents.; J Med Chem. 1984, 27, 121
16. Pattan, S. R.; Suresh, C.; Pujar, V. D.; Reddy, V. V. K.; Rasal, V. P.; Kotti, B. C.; Indian J Chem. 2005, 4B, 2404
17. Yoshida, M.; Hayakawa, I.; Hyashi, N.; Agatsuma, T.; Oda, Y.; Tanzawa, F. Synthesis and biological evaluation of benzothiazole derivatives as potent antitumor agents.; Bioorg Med Chem. Lett., 2005, 15, 3328
18. Bradshaw, T. D.; Bibby, M. C.; Double, J. A.; Fichtner, I.; Cooper, P. A.; Alley, M. C.; Donohue, S.; Stinson, S. F.; Tomaszewjski, J. E.; Sausville, E. A.; Stevens, M. F.; Mol. Cancer. Therapeutics, 2002, 1, 239
19. Hutchinson, I.; Jennings, S. A.; Vishnuvajjala, B. R.; Westwell, A. D.; Stevens, M. F. G.; J. Med. Chem., 2002, 45, 744

20. B. S. Tovrog, D. J. Kitko, and R. S Dragom, J. Am. Chem. Soc. 1976, 98, 5144.
21. H. Sharghi and M. A. Nasseri, Bull. Chem. Soc. (Jpn.) 2003, 76, 137.
22. Y. K. Choi, K. H. Chjo, S. M. Park, and N. Doddapaneni, J. Electrochem. Soc.

1995, 142, 4107.
23. B. Katia, L. Simon, R. Anne, C. Gerard, D. Francoise, and M. Bernard, Inorg. Ch 1996, 35, 387.
24. Z. M. Zaki, S. S. Haggag, and A. A. Soayed, Spectroscopy Letters 1998, 31, 757.
25. E. M. Hodnett and P. D. Mooney, J. Med. Chem. 1970, 13, 786.
26. E. M. Hodnett and W. J. Dunn, J. Med. Chem. 1972, 15, 339.
27. A. A.Maihub, M. M. El-Ajaily, J. Science Appls. 2006, 1 (1), 275.
28. F. M. Morad, M. M. El-Ajaily, and S. Ben Gweirif, J. Science. Appls. 2007, 1 (1), 72.
29. K. Mounika, B. Anupama, J. Pragathi, and C. Gyanakumari, Journal of scientific research, 2010, 2(3), 513-524.

To,
Dy. Registrar
P.G. Scetion
S.R.T.M. University Nanded.

Sub : Submission of my Synopsis
Ref : PG/Allocation / 2018-19 dated 29.04.2019

Through : Dr. Chidrawar A. B. (Associate Professor & HOD), **Degloor College, Degloor**

Respected Sir,

With reference to the above cited subject I am here by submitting the synopsis of my research topic in the subject **Chemistry** (Science & Technology) with consent from my allocated Research supervisor **Dr. Chidrawar A. B.** Associate Professor Dept. of Chemistry, Degloor College, Degloor Dist. Nanded and for further action.

So kindly accept the same and oblige.

Research supervisor : **Dr. Chidrawar A. B.** (Associate Professor)
Dept. of Chemistry, Degloor College, Degloor

Research Centre : Dept. of Chemistry, Degloor College, Degloor

Your's faithfully

Mr. Jadhav V. K.
Assistant Prof. & HOD,
Dept. of Chemistry
V.D.M.D. College Degloor
Nanded (M.S.)

To,
Dy. Registrar
P.G. Scetion
S.R.T.M. University Nanded.

Sub : Submission of Synopsis of my research scholar Mr. Jadhav V. K.
Ref : PG/Allocation / 2018-19 dated 29.04.2019

Respected Sir,

With reference to the above subject, I am here by submitting the synopsis of my Ph. D. research scholar **Mr. Jadhav V. K.** in the subject **Chemistry (Science & Technology).**

Please allow the research work of Ph. D. under my guidance.

So kindly accept the same and oblige.

Your's faithfully

Dr. Chidrawar A. B.
Research Guide & HOD,
Research Centre of Chemistry
Degloor College Degloor
Nanded (M.S.)